

CLAIMS

1. A hydrogen production method by gasification of combustibles, said method comprising a gasification step for
5 gasifying combustibles and a gas processing step for producing hydrogen by refining the gas produced in said gasification step, said gas processing step comprising:

a gas scrubbing step for absorbing and removing dust and a trace amount of acid gases such as hydrogen chloride and
10 hydrogen sulfide in the produced gas obtained in said gasification step by bringing the produced gas into contact with water or alkali solution; and

a carbon monoxide adsorption step for adsorbing and separating carbon monoxide by bringing the produced gas
15 scrubbed in said gas scrubbing step into contact with carbon monoxide adsorbent.

2. A hydrogen production method by gasification of combustibles according to claim 1, further comprising a
20 selective oxidation step for selectively oxidizing carbon monoxide in the scrubbed produced gas by a catalytic reaction with oxygen-containing gas, after said gas scrubbing step.

3. A hydrogen production method by gasification of combustibles according to claim 1 or 2, further comprising a
25 shift reaction step for converting carbon monoxide and steam

catalytic reaction, after said gas scrubbing step before

said selective oxidation step.

4. A hydrogen production method by gasification of combustibles according to any one of claims 1 to 3, further comprising a carbon dioxide chemical absorption step for absorbing and separating carbon dioxide in the produced gas by bringing the produced gas into contact with alkaline absorption solution, before said carbon monoxide adsorption step.

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5. A hydrogen production method by gasification of combustibles according to any one of claims 1 to 4, further comprising a carbon dioxide adsorption step for adsorbing and separating carbon dioxide in the produced gas by bringing the produced gas into contact with carbon dioxide adsorbent, before said carbon monoxide adsorption step.

6. A hydrogen production method by gasification of combustibles according to any one of claims 1 to 5, further comprising a hydrogen purifying step using hydrogen-absorbing alloy for separating nitrogen and argon in the produced gas and pressurizing hydrogen gas, after said carbon monoxide adsorption step.

7. A power generation method by gasification of combustibles for generating electricity by supplying hydrogen

to a fuel cell.

8. A power generation method by gasification of combustibles according to claim 7, wherein exhaust heat recovered by the cooling of said fuel cell is utilized as a heat source for hydrogen desorption in said hydrogen-absorbing alloy according to claim 6.

9. A power generation method by gasification of combustibles according to claim 7 or 8, wherein said fuel cell used in said fuel cell power generation step comprises a polymer electrolyte fuel cell or a phosphoric acid fuel cell.

10. A hydrogen production apparatus by gasification of combustibles, said apparatus comprising a gasification furnace for gasifying combustibles and a gas processing apparatus for producing hydrogen by refining the gas produced in said gasification furnace, said gas processing apparatus comprising:

a scrubbing tower for absorbing and removing dust and a trace amount of acid gases such as hydrogen chloride and hydrogen sulfide in the produced gas obtained in said gasification furnace by bringing the produced gas into contact with water or alkali solution; and

a carbon monoxide adsorption tower for adsorbing and separating carbon monoxide by bringing the produced gas scrubbed in said scrubbing tower into contact with carbon

11. A hydrogen production apparatus by gasification of combustibles according to claim 10, further comprising a selective oxidation reactor provided downstream of said scrubbing tower for selectively oxidizing carbon monoxide in
5 the scrubbed produced gas by a catalytic reaction with oxygen-containing gas.

12. A hydrogen production apparatus by gasification of combustibles according to claim 11, further comprising a shift
10 reactor provided downstream of said scrubbing tower or upstream of said selective oxidation reactor for converting carbon monoxide and steam in the produced gas into hydrogen gas and carbon dioxide by a catalytic reaction.

15 *2-1 A* 13. A hydrogen production apparatus by gasification of combustibles according to any one of claims 10 to 12, further comprising a carbon dioxide absorption tower provided upstream of said carbon monoxide adsorption tower for absorbing and separating carbon dioxide in the produced gas by bringing the
20 produced gas into contact with alkaline absorption solution.

14. A hydrogen production apparatus by gasification of combustibles according to any one of claims 10 to 13, further comprising a carbon dioxide adsorption tower provided upstream
25 of said carbon monoxide absorption tower for adsorbing and separating carbon dioxide in the produced gas by bringing the

15. A hydrogen production apparatus by gasification of combustibles according to any one of claims 10 to 14, further comprising an alloy accommodating container packed with hydrogen-absorbing alloy provided downstream of said carbon
5 monoxide adsorption tower for separating nitrogen and argon in the produced gas and pressurizing hydrogen gas.

16. A power generation system by gasification of combustibles for generating electricity by supplying hydrogen
10 gas produced by the apparatus according to any one of claims 10 to 15 to a fuel cell.

17. A power generation system by gasification of combustibles according to claim 16, wherein exhaust heat
15 recovered by the cooling of said fuel cell is utilized as a heat source for hydrogen desorption in said hydrogen-absorbing alloy according to claim 15.

18. A power generation system by gasification of combustibles according to claim 16 or 17, wherein said fuel
20 cell comprises a polymer electrolyte fuel cell or a phosphoric acid fuel cell.